Patent Claims

1. A recombination device (1, 1') for the catalytic recombination of hydrogen and/or carbon monoxide with oxygen in a gaseous mixture, for which at least one catalyst system (2) is arranged inside a housing (4) through which the gaseous mixture flows during the operational phase, wherein the catalyst system (2) is provided with several sub regions (T1, T2) in flow direction of the gaseous mixture, **characterized in that** in the inflow direction, a first sub region (T1) comprises a catalyst body (6) with surrounding retarding layer (8) for inhibiting the diffusion of the reaction gases flowing in and/or out and that a second sub region (T2) that adjoins the first sub region (T1) comprises at least one catalyst body (6), to which the reaction gases have direct access.

2. A recombination device (1, 1') according to claim 1, **characterized in that** the catalyst body (6) in the second sub region (T2) has a higher activity than the catalyst body (6) in the first sub region (T1).

Sub A'

3. A recombination device (1, 1') according to claim 1 or 2, **characterized in that** the catalyst body (6) in the second sub region (T2) comprises a plate-shaped sheet metal carrier that is coated with a catalyst material.

4. A recombination device (1, 1') according to claim 3, **characterized in that** the catalyst material contains a catalytic precious metal, in particular platinum or palladium.

Sub A2

5. A recombination device (1') according to one of the claims 1 to 4, **characterized in that** the retarding layer (8) in the first sub region (T1) in particular is a porous layer composed of a bulk material, in which the catalyst body (6) is arranged.

6. A recombination device (1) according to one of the claims 1 to 4, **characterized in that** the retarding layer (8) in the first sub region (T1) is deposited as porous cover layer onto the catalyst body (6).

7. A recombination device (1) according to one of the claims 1 to 6, **characterized in that** several identical catalyst systems (2) are arranged parallel to each other.

8. A recombination device (1) according to claim 7, **characterized in that** the catalyst systems (2) have a plate-shaped design with a respective total thickness of maximum 1 cm, preferably 0.3 mm, and that they are arranged side-by-side, at a distance of less than 20 mm.

Sub A3

9. A recombination device (1, 1') according to one of the claims 1 to 8, **characterized in that** an up-current protection (10) is provided at the front end of the catalyst system (2), in inflow direction of the gaseous mixture.

Sub A3, X con

10. A recombination device (1, 1') according to one of the claims 1 to 9, **characterized in that** a down current protection (12) is arranged in outflow direction of the gaseous mixture, at the end of the catalyst system (2).

11. A method for catalytically recombining hydrogen and/or carbon monoxide with oxygen in a gaseous mixture, for which the gaseous mixture is supplied to a catalyst body (6) for starting the recombination reaction, wherein only a partial amount of the gaseous mixture comes in contact with the catalyst body (6) in a first sub region (T1) in flow direction and wherein the catalyst body (6) is subjected completely to the gaseous mixture only in a second sub region (T2).

12. A method according to claim 11,
characterized in that in the first sub region (T1) the hydrogen content of the gaseous mixture is reduced through oxidation to less than 5% by volume.

13. A method according to claim 11,
characterized in that the complete gaseous mixture in the first sub region (T1) is guided over a retarding layer (8).

Sub A4

14. A method according to one of the claims 11 to 13,
characterized in that the partial amount of the gaseous mixture is adjusted such that the reaction temperature (T) in the first partial region (T1) is lower than in the second partial region (T2).

15. A method according to one of the claims 11 to 14,

characterized in that the partial amount of the gaseous mixture is adjusted such that in the first sub region (T1) the reaction temperature (T) is lower than 560 °C and/or in the second sub region (T2), the reaction temperature is higher than 560 °C.

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